

REMARKS

I. Introduction

In response to the Office Action dated December 9, 2002, claim 1 has been amended and new claims 37-39 have been added. Claims 1, 2, 4-9, 11-39 remain in the application, however, claims 18-34 have been withdrawn from consideration. Re-examination and re-consideration of the application, as amended, is requested.

II. Examiner Interview

On April 23, 2003, a telephone interview occurred between Examiner Matthew Song and Applicant's attorney, Bradley K. Lortz. Applicant's attorney called to determine the status of the application with respect to the amendment submitted March 7, 2003 and to indicate that a supplemental amendment would be forthcoming. Examiner Song confirmed that the amendment would not be reviewed until the following week (the week of May 4, 2003) and agreed to review the supplemental amendment.

III. Claim Amendments

Applicants' attorney has made amendments to the claims as indicated above. Particularly, independent claim 1 has been amended to delete the limitation of cancelled claim 3, wherein the graded gallium nitride layer has a net compressive stress.

IV. New Claims

New claims 37-39 have been added. New claim 37 is cancelled claim 3 reinstated. Claims 38 and 39 are new dependent claims directed to a net stress in the graded gallium nitride layer. Support for these claims can be found generally in the specification as filed and at paragraph [0008]. No new matter is involved.

V. Non-Art Rejections

In paragraphs (3)-(4) of the Office Action, claims 11-12 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In paragraph (5) of the Office Action,

claims 13-14 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

In response Applicants have previously amended these claims in the first amendment of March 7, 2003, to overcome the rejections. Support for these amendments is found at paragraph [0024] of the application as filed. No new matter is involved.

In paragraph (6) of the Office Action, claim 1 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Office Action asserts that the term "substantially" is indefinite as used in the phrase, "a substantially continuous grade".

In response Applicants submit that the term "substantially" is not indefinite because one of ordinary skill in the art would know what is meant by "a substantially continuous grade" and in view of the guidelines provided in the specification. The term "substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. In *re Nehrenberg*, 280 F.2d 161, 126 USPQ 383 (CCPA 1960). The court held that the limitation "to substantially increase the efficiency of the compound as a copper extractant" was definite in view of the general guidelines contained in the specification. In *re Mattison*, 509 F.2d 563, 184 USPQ 484 (CCPA 1975). The court held that the limitation "which produces substantially equal E and H plane illumination patterns" was definite because one of ordinary skill in the art would know what was meant by "substantially equal." *Andrew Corp. v. Gabriel Electronics*, 847 F.2d 819, 6 USPQ2d 2010 (Fed. Cir. 1988). See MPEP §2173.05(b), subsection D.

VI. Prior Art Rejections

In paragraphs (7)-(8) of the Office Action, claims 1-15 were rejected under 35 U.S.C. §102(b) as being anticipated by Edmond et al., U.S. Patent No. 5,739,554 (Edmond). In paragraph (9) of the Office Action, claims 1-17 were rejected under 35 U.S.C. §102(b) as being anticipated by Redwing et al., U.S. Patent No. 5,874,747 (Redwing). In paragraphs (10)-(11) of the Office Action, claims 16-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Edmond in view of Goetz et al., U.S. Patent No. 6,441,393 (Goetz).

Applicants respectfully traverse these rejections for the reasons set out below.

Independent claim 1 is directed to a semiconductor film, comprising a silicon substrate and a graded gallium nitride layer deposited on the silicon substrate having a varying composition of a substantially continuous grade from an initial composition to a final composition.

The cited references do not teach nor suggest these various elements of Applicants' independent claim.

Edmond merely describes a double heterostructure for a light emitting diode comprising a layer of aluminum gallium nitride having a first conductivity type; a layer of aluminum gallium nitride having the opposite conductivity type; and an active layer of gallium nitride between the aluminum gallium nitride layers, in which the gallium nitride layer is co-doped with both a Group II acceptor and a Group IV donor, with one of the dopants being present in an amount sufficient to give the gallium nitride layer a net conductivity type, so that the active layer forms a p-n junction with the adjacent layer of aluminum gallium nitride having the opposite conductivity type. However, Edmond lacks any discussion about a graded gallium nitride layer deposited on a silicon substrate. Instead, Edmond teaches away from Applicants' invention because it teaches only a graded layer on a silicon carbide substrate.

Applicants submit that because each and every element of the claimed invention is not taught by Edmond, the present §102 rejection is overcome.

Redwing merely describes a green-blue to ultraviolet light emitting semiconductor laser having a top contact, a Bragg reflector, cladding layer, active layer, cladding layer, buffer, substrate, bottom contact and a passivation layer. The key aspect is a Ga*N material on a base structure comprising a SiC substrate selected from a group consisting of 2H-SiC, 4H-SiC and a-axis oriented 6H-SiC. Furthermore, the cladding layers have larger band gaps than the active layer and are complementarily doped. However, like Edmond, Redwing lacks any discussion about a graded gallium nitride layer on a silicon substrate.

Applicants submit that because each and every element of the claimed invention is not taught by Redwing, the present §102 rejection is overcome.

Finally, Goetz merely describes a semiconductor device is provided having n-type device layers of III-V nitride having donor dopants such as germanium (Ge), silicon (Si), tin (Sn), and/or oxygen (O) and/or p-type device layers of III-V nitride having acceptor dopants such as magnesium (Mg), beryllium (Be), zinc (Zn), and/or cadmium (Cd), either simultaneously or in a doping

superlattice, to engineer strain, improve conductivity, and provide longer wavelength light emission. However, like Edmond and Redwing, Goetz lacks any discussion about a graded gallium nitride layer on a silicon substrate as claimed. Instead, Goetz teaches a buffer layer 12 disposed between the substrate and a graded nitride layer 13. See FIG. 1 and col. 6, lines 8-14.

Even when combined, Edmond and Goetz would teach away from Applicants' invention. For example, the combined references would teach a thin buffer layer on a SiC substrate with graded gallium nitride layer disposed on the thin buffer layer.

Thus, neither Edmond nor Goetz, alone or in combination, teach or suggest a graded gallium nitride layer on a silicon substrate as presently claimed. Applicants submit that because each and every element of the claimed invention is not taught in the combined references of Edmond and Goetz, the present §103 rejection is overcome.

Moreover, the various elements of Applicants' claimed invention together provide operational advantages over Edmond, Redwing, and Goetz. For example, the use of silicon substrates rather than sapphire or silicon carbide substrates in the production of semiconductor will result in additional cost savings. See paragraph [0007] of the application as filed.

Thus, Applicants submit that independent claim 1 is allowable over Edmond, Redwing, and Goetz. Further, dependent claims 2, 4-9, 11-17, 35-39 are submitted to be allowable over Edmond, Redwing, and Goetz in the same manner, because they are dependent on claim 1 and thus contain all the limitations of the independent claim. In addition, dependent claims 2, 4-9, 11-17, 35-39 recite additional novel elements not shown by Edmond, Redwing, and Goetz.

VII. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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